Space Weather Forecast

Issued on Tuesday, 15 August 2023 at 13:05 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Peak Minor Geomagnetic Storm G1 risk before midweek, falling with time. Chance of Minor Radio Blackout R1 throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over the past 24 hours, with the peak flare a long-period upper end Common-class flare from a large sunspot group on the eastern solar horizon at 14/2110UTC. This was observed on a background of declining low Common-class activity.

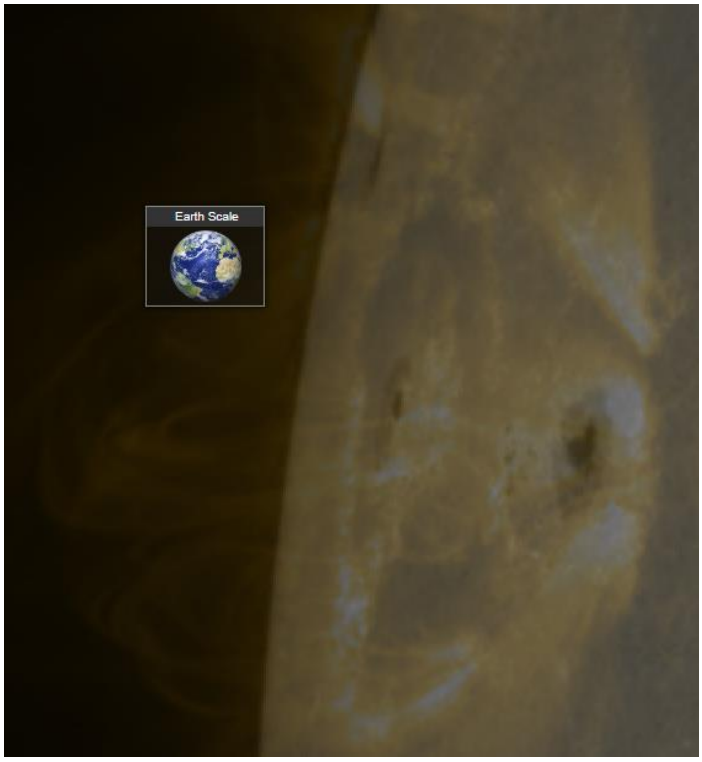

Figure 1: Helioviewer.org-generated composite image of proxy for magnetic field structure in extereme UV (yellow flux) and the sunspots' visible appearance (black and white image) at 15/0900UTC. This shows the region responsible for the peak flare in the past 24 hours and perhaps a second region to its immediate northeast. Earth and curvature of solar horizon shown for scale.

There are now up to seven sunspot regions on the facing side of the Sun, with two small new magnetically bipolar regions in the southern solar hemisphere. The sunspot responsible for the peak flare is rivalled in complexity by a second in the central northern hemisphere, which showed a spreading tendency, areal growth and proliferation of its intermediate spots. The remaining regions were mainly simpler or decaying magnetically bipolar groups.

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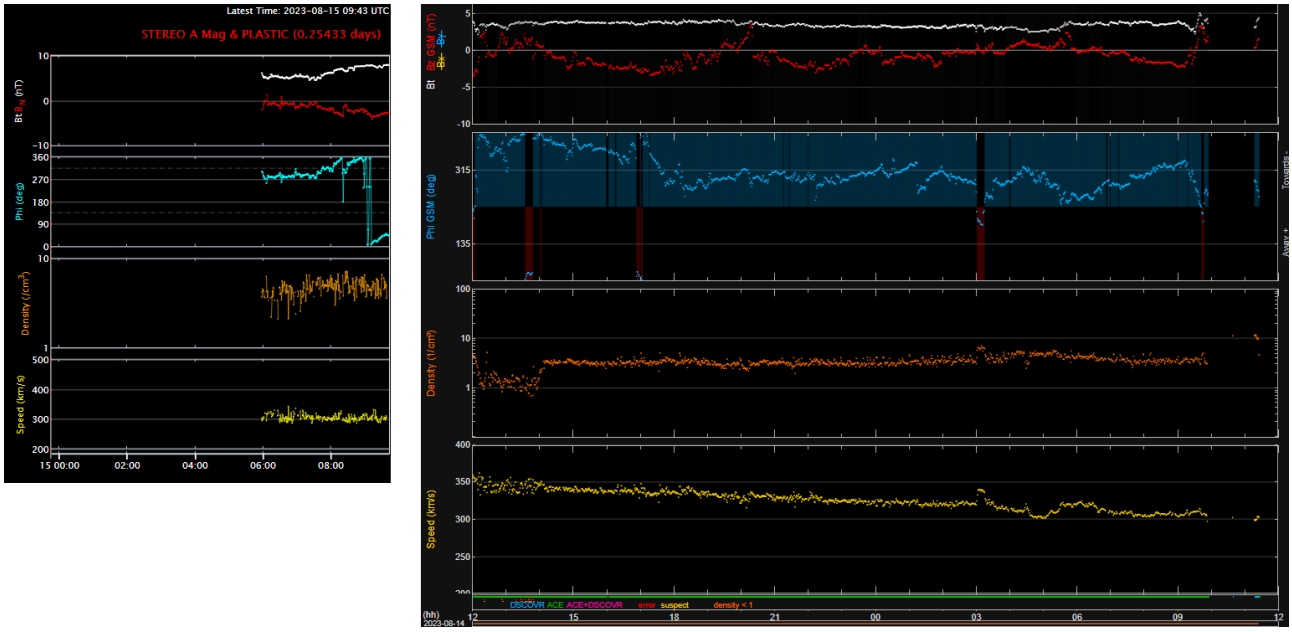
There were up to three Coronal Mass Ejection (CME) events noted on available satellite imagery in the past 24 hours - the first from the aforementioned peak flare, and a second that has been inferred as most likely from the far side eastern solar hemisphere, and the third from behind the western solar horizon in the current UTC morning. Modelling has not yet been conducted on the third of these events, but none is expected to affect Earth. No Earth-bound CMEs were noted.

Solar Wind / Geomagnetic Activity: The solar wind was characterised by an ongoing slow solar wind regime, but with some late-period signals that a fast wind may be imminent (rising magnetic field and number of particles in the solar wind). The solar wind speed showed a falling trend within background, while their magnetic field was similarly subdued. The north-south component of the field was mainly anti-aligned with Earth's (usually to greater geomagnetic effect) but small in magnitude.

Figure 2: (Left) Measurements from a satellite sampling the solar wind around five hours in advance of their affecting Earth, showing a possible sector change around 15/0900UTC (blue line). This is a pre-requesite for seeing the first fast wind stream at Earth. On the right, the recent near-Earth solar wind has become more restive in advance of this (around the time of the data outage on the right of the chart), and the fast wind may very shortly become geoeffective.



The net result of the above solar wind measures was for provisionally quiet geomagnetic indices throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: There is a daily chance of activity rising to moderate levels with isolated Moderate-class flares. Western solar horizon departures are expected to be roughly compensated for by eastern arriving groups, giving a broadly flat trend.

Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs in the forecast. There are up to two fast wind streams due in the period. The first will be the more potent if it manifests, and

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then the second is perhaps most likely midweek. Current quiet conditions carry a chance of rising to Minor Geomagnetic Storm G1 in the near-term, with this risk falling back to quiet later in the working week as any fast wind regimes mature and then wane.

Energetic Particles / Solar Radiation: No solar radiation storms are expected.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	40	20	20	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	40	40	40
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	2	2	2	2
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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